Studies on Sensory Overload: IV Part 3. Results of Memory, Learning, Association Tests and Interview

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PART 3. RESULTS OF MEMORY, LEARNING, ASSOCIATION TESTS AND INTERVIEW

By

NOBUYUKI KAWATA (河田信之), MUTSUO SHIMADA (島田睦雄)*
and YOSHIAKI NIHEI (仁平義明)

(Department of Psychology, Tohoku University, Sendai)

Effects of sensory overload (SO) and sensory deprivation (SD) in comparison with control condition were investigated through the following tests and interview; memory, rule learning and association tests. Major results were as follows: (1) Effects of SO or SD on memory and learning functions were not specified. (2) Association test which was used as a kind of projective technique to survey the *S*'s state of affect revealed that SO and SD conditions tended to depress positive affect and enhance negative affect. (3) The hallucination-like phenomena and the underestimation of confined hours were observed under both SO and SD conditions.

To investigate the effects of 3-hr. sensory overload (SO) and sensory deprivation (SD) on memory process, thinking, state of affect, time estimation, occurrence of hallucination-like phenomena, and some other mental aspects, the following tests and interview were conducted:

1. Memory
2. Rule learning
3. Association
4. Interview

The association tests that had not been contained in the previous study, were newly introduced to survey *S*'s state of affect which was supposed to be projected into association.

1) MEMORY

METHOD

Subjects: The data analyzed here were obtained from 10 *S*s of SO, SD and Control group respectively (Total=30 *S*s).

Procedure: The same procedure as in the previous study (Saito, 1971) was used, except that the test items per one trial were increased from 10 to 15.

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* Now at National Institute of Occupational Research, Tokyo.

Results and Discussion

Memorization: Mean percentages of correct recall over ten trials by immediate recall in pre- and post-test are shown in Table 1.

Table 1. Mean percentages of correct recall in immediate recall.

Group		Pre.	Post.
SO	Mean	52.1%	54.8%
	SD	8.3	10.0
SD	Mean	42.9%	50.3%
	SD	5.9	9.1
Cont.	Mean	43.7%	49.2%
	SD	10.3	11.1

Each group similarly shows an increasing tendency of correct recall in post-test as compared with pre-test. This tendency was statistically significant in SD group (t=3.66, df=9, $p<.01$), and in the other two groups the statistical significance failed to be found. But among three groups, the differences of the change were not statistically significant.

Retention: The items whch were memorized in pre-test were recalled in post- SO, -SD, or -Control test. The percentages of correct recall in post-test to that in pre-test (the percentages of retented items) are shown in Table 2. There were no statistically significant differences among three groups.

Table 2. The percentages of retented items.

Group	Mean %	SD
SO	77.3	27.9
SD	74.5	10.4
Cont.	61.0	17.7

As demonstrated above, we could not specify the effects of SO or SD on memory functions. But we cannot say definitely that SO or SD have no effect on memory functions, for this memory test was administered about one hour after SO or SD. The test had to be carried out more immediately after SO or SD to specify the effects of these conditions.

2) *RULE LEARNING*

Method

Subjects: Data analysed were obtained from 10 *S*s of three groups respectively (Total=30 *S*s).

Procedure: The same procedure and the same stimuli as in the previous study (Saito, 1971) were used. *S*s inferred the rule according to which the presented cards were to be classified into two classes.

Results and Discussion

Mean trials required for the attainment of the rule learning are shown in Table 3. There were no statistically significant differences among three groups.

Table 3. Mean trials required for attainment.

Group	Required trials	SD
SO	8.6	1.7
SD	8.0	2.2
Cont.	8.2	2.4

This result disagrees with that of the previous study (Saito, 1970). In the previous study, SO group *S*s attained the learning more rapidly than SD *S*s. But from the fact that in the previous study the sample was relatively small (SD=6 *S*s, SO=10 *S*s) and that the test was conducted only in post-test, we must consider the possibility that the results reflected the individual differences of *S*s between two groups. Further study should be expected to clarify the SO or SD effect on learning more precisely.

3) *ASSOCIATION*

Method

Subjects: The data with 10 SO *S*s, 9 SD *S*s and 10 Control group *S*s were available (Total=29 *S*s).

Procedure: A kind of sequential association was employed for a projective survey into *S*'s state of affect. In this test, *S*s were instructed to associate, first, an object, next, to associate an attribute which was an attribute of the object, and then to associate an object which had the attribute.

object-attribute-object-attribute-object....

In such a way, *S* continued the association where objects and attributes were alternated sequentially. An example of the association is as follows:

White is *snow*, snow is *beautiful*, beautiful is a *girl*, a girl is *tender*, tender is....

Only the start word 'WHITE' was given to *S* by experimenter. And then *S* started association freely. 10 minutes after starting, the association was stopped.

Results and Discussion

The data were analyzed in two aspects: aspect of quantity and aspect of quality, especially of affective tone.

Quantity of association: Quantity of association was measured by the number of associated objects during 10 minutes association period. The number of associated object is shown in Table 4. There were no statistically significant differences among three groups.

Table 4. The number of associated object.

Group	Number	SD	Range
SO	21.9	7.5	10-40
SD	18.4	7.5	5-29
Cont.	23.6	5.3	17-35

Affect reflected in association: Associated attributes which seemed to have affective tone were sorted out of all the associated attributes. And they were classified into 'positive' and 'negative' affect. The attributes which were classified as 'positive' or 'negative' were as follows:

positive	negative
happy	unpleasant
joyful	disagreeable
comfortable	uncomfortable
pleasant etc.	hard etc.

Percentages of negative affect or positive affect among all the associated attributes are shown in Fig. 1.

The rate of occurrence of negative affect was the highest under SD condition, and the lowest in Control group. The rate of occurrence of positive affect, conversely, was the highest in Control group, and the lowest in SD group. Especially the difference between SD and Control groups is statistically significant ($\chi^2=2.38$, $df=1$, $p<.05$).

In Control group, positive affect was more frequently observed than negative affect. In SD and SO group, however, negative affect more frequently occurred than positive affect.

Thus SD and SO conditions seemed to depress positive affect and enhance negative affect, if the association reflects the state of *S*'s affect. Furthermore, it is surprising that such effect was observed still about two hours after SO or SD (for, this association test was carried out about two hours after SO or SD), and that the effect tended to be more marked in SD than in SO.

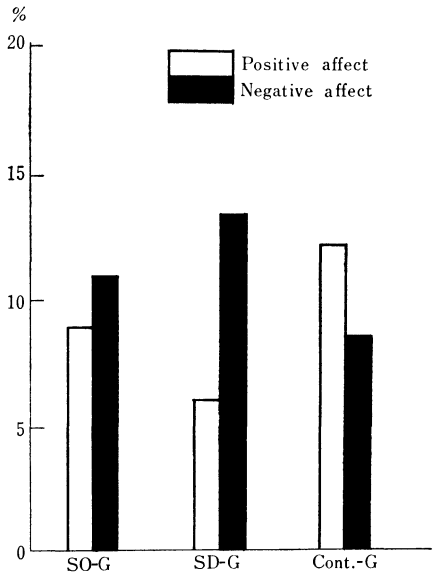

Fig. 1. Percentages of positive and negative affect in association test.

4) *INTERVIEW*

Method

The interviews were had in a similar way to those in our previous study (Shimada, Kawata & Okabe, 1971). The first interview at pre-test session was held briefly on the following items: (1) *S*'s present state of mind and body (2) Activities of *S* before experiment. The second interview at post-test session was held on the following items: (1) Contents of conscious experience during the confinement (2) Estimation of emotional states (3) Hallucination-like experience (4) Attitude toward the experiment. Furthermore, *S*s were asked to estimate the confined hours through interphone immediately after the confinement.

Data were obtained from 10 *S*s in each group.

Results and Discussion

(1) SO and SD subjects reported that they had some difficulty in thinking about clearly during the confinement. Control subjects, who were allowed to assume some activities such as reading books or looking outside of the windows also reported similar experience.

(2) *S*s estimated their emotional states on the 5-grade scale of pleasure-unpleasure and emotional security-insecurity. The results showed that SO condition was more negative to them than SD or Control conditions.

In the evaluations, made by *S*s, of each aspect of experimental conditions (i.e.; sonic stimulation, photic stimulation, movement restriction, social isolation, loss of temporal information and the others), the most negative evaluation was made for sonic stimulation and movement restriction in SO group, and for movement restriction in SD group.

(3) Hallucination-like experiences were reported by 2 *S*s in SO group; one of them was visual (something white seemed to have passed by), and another was auditory (a dull, short, low but considerably clear sound). In SD group, 3 *S*s reported such experiences; two of them were of sensory-motor (sensation as if the sofa were swaying, and sensation as if his body were drifting in the air), and the third was auditory (something like ringing in the ears).

Judging from our previous data (Shimada et al, 1971) in which hallucination-like experiences were reported by *S*s in both SO and SD groups, it may be suggested that such phenomena can be produced also under SO condition, not only under SD conditions.

(4) The results of time estimation made immediately after the 3-hour confinement are presented in Table 5. A considerable tendency of underestimation is seen

Table 5. Results of time estimation.

Group	N	Over-estimation	Under-estimation	Correct estimation
SO	10	3	6	1
SD	10	3	6	1
Cont.	10	1	6	3

in each group. Similar results were obtained in our previous study held under 3-hour SO and SD conditions (Shimada et al, 1971). *S*s of Control group, who had had some external temporal cues such as the sights outside the window, also showed the same tendency of underestimation.

In SD experiments, we have reported a marked tendency of underestimation of confined hours, with the confinement of 48 hours (Kato & Saito, 1964), 24 hours (Suzuki & Ueno, 1965; Ueno, Ohyama, Oyamada & Kato, 1966; Kato, Tanaka, Tada & Hatayama, 1967) and 18 hours (Sato & Ohyama, 1965), as well as 3 hours. SO experiments also revealed underestimation of confined hours. Thus it may be indicated that underestimation is caused, regardless of SO or SD, under such confinement conditions.

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